

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE: The application of George S. Rhyneer

TITLE OF THE INVENTION

Shock-actuated Lock With Resettable Ball

CROSS REFERENCE TO RELATED APPLICATIONS

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH AND
DEVELOPMENT

Not Applicable

BACKGROUND OF THE INVENTION

1. Field of the invention

This invention relates to earthquake locks for cabinets and particularly to earthquake locks for cabinets using magnetic latches.

2. Description of the Prior Art

Earthquakes have been a part of the world since the beginning of time. They are cause of much destruction. Most earthquakes however are not catastrophic events. These minor earthquakes may still cause damage as items are thrown off shelves and contents of closed cabinets are discharged into the room. Not much can be done to protect items stored on open shelves. However, closed cabinets have doors that, if they were to remain closed in an earthquake would prevent a lot of incidental damage. To that end, several types of "earthquake lock" have been invented that allow normal use of cabinets under ordinary circumstances, but act to lock the cabinets doors shut in the

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1 event of seismic activity. U.S. Patents that address this problem are Patent No.
2 5,152,562 and 5,518,282. Patent No. 5,152,562 teaches a device that uses a ball that is
3 held in an elevated position in a housing. At the base of the housing is a latch that
4 attaches to the inside of a cabinet door. The latch has a slot cut into it such that when
5 the door is closed, the slot is positioned under the ball. When an earthquake strikes, if
6 the force is sufficient, it causes the ball to be pushed from its resting position and down
7 into the slot. This then prevents the door from opening and spilling the contents of the
8 cabinet. Although this system appears to work, it has several problems. First, the ball
9 is set in a recess. Although the sensitivity of the device can be adjusted, it can take
10 considerable force to cause the ball to drop. Second, the latch with the slot is attached to
11 the door. If the movement that causes the ball to fall also causes the door to fly open,
12 the ball will not fall into the slot. If the door has opened widely enough, it may even
13 block the door from closing again. Finally, once the lock is set, there is no way to open
14 the cabinet again. The patent teaches securing a string that passes through the side of
15 the cabinet so that a user can pull the ball back up so that the door can be opened.

16 U.S. Patent No. 5,518,282 teaches a system that keeps a door or drawer locked all
17 the time. In this way, an earthquake cannot cause the door to open. Moreover, because
18 the door is locked all the time, there is no need for a system to cause the door to be
19 locked, with the inherent possibility of the failure of the system. The patent uses a
20 hooked shaped latch that hooks onto a ledge attached to the door. There is a release
21 mechanism provided that allows the door to be opened for ordinary use. While this

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1 device eliminates the need for a device to lock the door in the event of an earthquake, it
2 has the problem of prevent easy access to the contents of the cabinets. Because
3 earthquakes rarely occur but accessing the cabinets is a daily occurrence, this system
4 rapidly becomes a nuisance.

5 Two systems have been developed in Japan as well. JP9067970A2 and
6 JP9078926A2 use balls to engage latches to prevent doors from opening in the event of
7 an earthquake. JP9067970A2 teaches a system similar to Patent No. 5,152,562 in that a
8 ball is designed to drop into a bracket with a slot, which is attached to the door.
9 JP9078926A2 teaches a system in which a ball drop down and engages a spring
10 mechanism that causes two pins to laterally move into holes drilled in the doors. Once
11 the pins are in place, the doors will not open. These systems suffer from the same
12 problem as discussed above: if the doors are open at the same time the ball drops, the
13 ball does not align with the slot in the bracket in the first case, or what is worse, the pins
14 will not align with the holes in the doors in the latter case. This is worse because one
15 the pins have been deployed, the doors will not close fully. Thus, when the next jolt
16 hits, the doors may be flung open, with the locks having no effect.

BRIEF DESCRIPTION OF THE INVENTION

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18 The instant invention solves all of these problems. It is a lock for earthquakes
19 that securely holds a door closed when an earthquake strikes, but it otherwise out of the
20 way during normal use. It consists of a steel ball that is positioned at the top of an
21 angled ramp. A magnet is embedded on the inside surface of the door, where it is

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1 invisible under normal use. When an earthquake strikes, the steel ball drops and
2 contacts the magnet. At this point, the door is effectively locked. The system is
3 designed so that the magnet is strong enough to securely hold the door closed, but can
4 be easily overcome to open the door after the event is over. Moreover, unlike the other
5 designs, if the door should open as the ball is dropping, the magnet will engage the ball
6 as soon as it closes. There is no problem with alignment. In this way, the system is
7 simple and effective. Once the event is over, the system can be reset by pulling the door
8 open with enough force to overcome the magnet and placing the ball back up into its
9 ready position. There is no need for strings that penetrate the cabinets or for large
10 latches attached to the door. When closed, the cabinets appear perfectly normal. When
11 the door is open, the only thing a user sees is a small magnet inlaid into the door and
12 the ball and ramp.

13 It is an object of the invention to produce an earthquake lock for cabinet doors
14 that allows normal operation of the doors during ordinary use.

15 It is another object of the invention to produce an earthquake lock for cabinet
16 doors that does not require a mechanism for resetting the lock after an event.

17 It is yet another object of the invention to produce an earthquake lock for cabinet
18 doors that does not incorporate intrusive components that are attached to the cabinet
19 door.

BRIEF DESCRIPTION OF THE DRAWINGS

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Figure 1 is a partial side view of the interior of a cabinet with the invention installed and with the ball in the ready position.

Figure 2 is a partial side view of the interior of a cabinet with the invention installed and with the ball in the lock position.

Figure 3 is a partial view of the inner surface a cabinet door showing a magnet inlaid therein.

Figure 4 is a partial side view of the interior of a cabinet with the invention installed showing the ball down and the door locked.

Figure 5 is a front detail view of the track showing the ball in the ready position.

Figure 6 is a front detail view of the track showing the ball in the lock position.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to fig. 1, a partial side view of the interior of a cabinet 100 is shown. Here, the device 1 is shown installed. The device 1 consists of a base plate 2, a ramp 3 and a stop plate 4. The ramp 3 has three main parts. The first is an elevation block 3a, the second is the upper ramp 3b and the third is the vertical ramp 3c. Note that in the preferred embodiment, the vertical ramp portion 3c is set at a slight back angle to ensure a smooth ball drop. In the preferred embodiment, a plurality of ribs 3d (see fig. 6) are used to hold the ball in place in the upper ramp 3b. A ball 5 is shown in place in the upper ramp 3b. A stop plate 4 is positioned at the front of the device and is secured into the base using common fasteners (on the other hand, the entire unit can be made of plastic or light non-ferrous metal, it desired).

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1 Figure 2 shows the same view as figure 1, with the ball 5 at the base of the
2 vertical ram 3c. Here, the stop plate 4 is shown retaining the ball in the device.

3 Figure 3 shows the inside face of a door 101. A magnet 6 is installed in the door
4 101. In the preferred embodiment, the magnet is inlaid in the door to provide a smooth,
5 pleasing appearance. Note the pull handle screw 102 is shown just above the magnet.

6 Figure 4 shows the magnet in the lock position and the door 101 closed. Here,
7 the magnet 6 (shown in dashed lines) is pressed against the ball 5. In this position, the
8 door is held shut by a significant force. However, it is possible to overcome this force
9 by pulling on the pull handle 103. Figure 2 shows the position of the components after
10 the door is opened. In the preferred embodiment, the ball 5 is repositioned by pushing
11 the ball back up to the top ramp 3b. This is a simple way of resetting the door without
12 having to use complicated strings to spring reset features.

13 Figures 5 and 6 show front view of the device with the ball in the ready position
14 and in the lock position. Here, the stop plate 4 is clearly shown. The plate has an open
15 center that allows the ball to protrude slightly past the stop plate (see fig. 2). These
16 figures also show the fasteners 10 that secure the stop plate to the base 2. Figure 6
17 shows the ribs 3d used to provide a frictional surface to hold the ball in place at the top
18 of the ramp. Of course, other means may be used to hold ball in the ready position.
19 The only criteria are that the ball remains in place in the ready position during ordinary
20 use and that the ball is free to drop when a sufficient shaking force is experienced. The
21 ribs 3d can be considered as a means for retaining said ball in said upper portion of the

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

1 ramp. The ribs create a frictional force that can be defined as creating a threshold of
2 motion, below which, the ball 5 is held motionless in said upper portion of the ramp.
3 Above the threshold of motion, the ball overcomes the frictional force and is then able
4 to move in ramp until it falls to the bottom of the ramp. A moderate earthquake should
5 have enough force to overcome the threshold of motion.

6 The present disclosure should not be construed in any limited sense other than
7 that limited by the scope of the claims having regard to the teachings herein and the
8 prior art being apparent with the preferred form of the invention disclosed herein and
9 which reveals details of structure of a preferred form necessary for a better
10 understanding of the invention and may be subject to change by skilled persons within
11 the scope of the invention without departing from the concept thereof.